

## PATENT ABSTRACTS OF JAPAN

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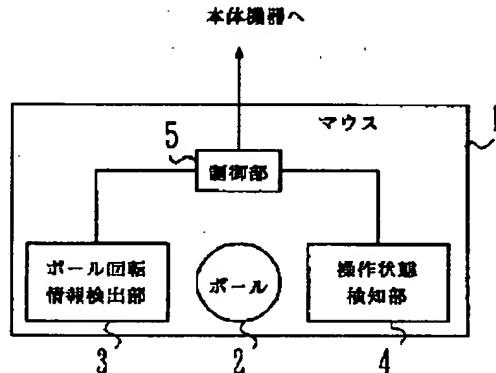
## (54) CURSOR OPERATING DEVICE

## (57) Abstract:

PURPOSE: To efficiently save the electric power of a battery-driven computer equipment which uses the cursor operating device by stopping supplying electric power to a ball rotation information detection part when the non-operation state of the cursor operating device is detected, and restarting the power supply when the in-operation state is detected in the stand-by mode.

CONSTITUTION: A control part 5 monitors the signal from an operation state detection part 4 and stops supplying the electric power to the ball rotation information detection part 3 unless an operator operates a mouse 1 to places the control part 5 itself in the stand-by mode. The control part 5 in the stand-by mode monitors the detecting operation of the operation state detection part 4 under timer interruption control. When the operator presses a button or uses the mouse 1 by rotating the ball 2, the control part 5 inputs the detection signal of the use state of the mouse 1 from the operation state detection part 4 by the timer-interruption control. Then the stand-by mode is reset and the electric power supply is restarted.

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[0006]

[Means for Solving the Problems]

In order to attain the object explained above, (1) the cursor manipulating device of the present invention is designed as a cursor manipulating device such as a mouse to input the cursor position on the display area based on rotation of ball by comprising a freely rotatable ball and ball rotation information detecting means for detecting amount and direction of rotation of such ball, which is characterized by providing a manipulating condition detecting means for detecting whether the cursor manipulating device is in the manipulation or not and a control means for suspending power feeding to the ball rotation information detecting means, when non-operating condition of the cursor manipulating device is detected, to establish the stand-by mode for only monitoring the detecting operation of the manipulating condition detecting means with the timer interruption control and also cancels such stand-by mode, when the manipulating condition detecting means detects the operating condition of the cursor manipulating device during the stand-by mode, in order to start again the power feeding to the ball rotating information detecting means. Moreover, (2) the cursor manipulating device described in (1) is characterized in that a ball rotation detecting means to detect the rotating condition of ball is provided as the manipulating condition detecting means and the control means controls the stand-by mode based on the ball rotating condition detecting result by the ball rotation detecting means. Moreover, (3) the cursor manipulating device described in (1) is characterized in that a manipulating person detecting means is provided as the manipulating condition detecting means to detect whether the hand of manipulating person is touched on the cursor manipulating device or not and the control means controls the stand-by mode based on the detection result of the manipulating person detecting means. Moreover, (4) the cursor manipulating device described in (1) is characterized in that an x coordinate detecting means for detecting amount of rotation in the X-axis direction of ball and a y coordinate detecting means for detecting amount of rotation in the y-axis direction of ball are provided as the ball rotation information detecting means and manipulating condition detecting means and the control means suspends power feeding to the x coordinate detecting means and controls the stand-by mode for monitoring the detecting operation of the y coordinate detecting means.

[0007]

[Operation]

In the present invention, the control means suspends power feeding to the x coordinate detecting means under the assumption that no-manipulation is conducted when the ball, for example, is not rotated and sets the control means itself to the stand-by mode. In this stand-by mode, the control means can detect interruption from the y coordinate detecting means and monitors start of manipulation with this interruption signal. Thereby, power of the cursor manipulating device such as mouse can be saved and useless power consumption of the body can be avoided. Moreover, whether hand is touched on the mouse or not is detected and when the hand is not touched on the mouse, the control means suspends power feeding to the x coordinate detecting means and y coordinate detecting means to provide the stand-by mode. Thereby, power saving can be realized and even when a document collides with the mouse, etc., cursor position

does not change and unexpected cursor movement can be avoided.

[0008]

[Embodiment]

An embodiment of the present invention will be explained in more detail with reference to the accompanying drawings. Fig. 1 is a block diagram of a cursor manipulating device of the present invention illustrating the first embodiment in the structure in relation to the present invention. The mouse 1 of the first embodiment is composed of a freely rotatable ball 2, a ball rotating information detecting means 3 for detecting direction and amount of rotation of the ball 2, a manipulating condition detecting means 4 for detecting the manipulating condition of ball 2 by a manipulating person and a control means 5 for controlling connection with the device body and conducting transfer control of detecting information to the body from the ball rotating information detecting means 3 and the power saving control in relation to the present invention. Here, the mouse 1 is also provided with a button not illustrated and a manipulating person can input an instruction such as icon manipulation of the body side with manipulation of such button.

[0009]

In the mouse 1 of the first embodiment, the control means 5 monitors the signal from the manipulating condition detecting means 4 and stops, when the mouse 1 is not manipulated by a manipulating person, power feeding to the ball rotating information detecting means 3 and also sets the control means 5 itself to the stand-by mode. In this stand-by mode, the control means 5 performs the operation only to monitor the detecting operation of the manipulating condition detecting means 4 with the timer interruption control. Thereby, when the mouse 1 not used, power feeding from the apparatus body is no longer required, realizing the power saving. When a manipulating person depresses a button not illustrated or uses the mouse 1 by rotating the ball 2, the control means 5 inputs the signal for detecting the using condition of the mouse 1 from the manipulating condition detecting means 4. Thereby, the stand-by mode can be canceled and power feeding to the ball rotating information detecting means 3 may be started again.

[0010]

Fig. 2 is a block diagram illustrating the second embodiment of the structure in relation to the present invention of the cursor manipulating device. In this figure, 1a designates a mouse as the cursor manipulating device of the second embodiment; 2, a freely rotatable ball; 3, a ball rotating information detecting means for detecting rotating direction and rotating amount of the ball 2; 4a, a ball rotation detecting means for detecting the rotating condition of the ball 2; 5a, a control means for conducting the stand-by mode control explained in Fig. 1 with reference to the rotating condition detection result of the ball 2 by this ball rotation detecting means 4a. Here, the mouse 1a is provided with a button not illustrated and the manipulating person is capable of inputting a instruction for icon manipulation, etc. in the apparatus body side with manipulation of this button.

[0011]

In the mouse 1a of the second embodiment, the control means 5a monitors the signal from the ball rotation detecting means 4a. When the ball 2 is not manipulated by the manipulating person, namely when the mouse 1a is not used, the control means 5a stops power feeding to the ball rotation information detecting mans 3 and sets itself to the stand-by mode. In this stand-by mode, the control means 5a performs only the operation to monitor the rotating condition detecting condition of the ball 2 by the ball rotation detecting means 4a with the timer interruption control. Therefore, power feeding from

the apparatus body is no longer required and power saving can be realized. When the manipulating person uses the mouse 1a, the ball 2 rotates and the control means 5a inputs the rotating condition detecting signal of the ball 2 with the timer interruption control. Thereby, the stand-by mode is canceled and power feeding to the ball rotation information detecting means 3 is started again.

[0012]

Fig. 3 is a block diagram illustrating the third embodiment of the structure in relation to the present invention of the cursor manipulating device of the present invention. In this figure, 1b designates a mouse as the cursor manipulating device of the third embodiment; 2, a freely rotatable ball; 3a, an x coordinate detecting means for detecting amount of rotation in the x direction of ball 2; 3b, a y coordinate detecting means for detecting amount of rotation in the y direction of ball 2; 5b, a control means which stops power feeding to the x coordinate detecting means 3a based on the detecting result for stop of rotation of ball 2 by the x coordinate detecting means 3a and 7 coordinate detecting means 3b and executes the stand-by mode control based on the monitoring of detecting operation of the y coordinate detecting means 3b. The mouse 1b is provided with a button not illustrated and a manipulating person is capable of inputting an instruction such as manipulation of icon in the side of apparatus body by manipulating this button.

[0013]

In the mouse 1b of the third embodiment, the control means 5b monitors the signal from the x coordinate detecting means 3a and y coordinate detecting means 3b. When the result of monitoring indicates the condition where the manipulating person does not use the mouse 1b, the control means 5b stops the power feeding to the x coordinate detecting means 3a and sets the control means 5a itself to the stand-by mode. Thereby, power saving can be realized. In this stand-by mode, the control means 5b performs only the operation to monitor the detecting operation for rotation of the ball 2 by the y coordinate detecting means 3b through the timer interruption control and therefore the power feeding from the apparatus body side is no longer necessary.

When the manipulating person uses the mouse 1b, the y coordinate detecting means 3b detects rotation of the ball 2 and the control means 5b inputs the detecting signal of the y coordinate detecting means 3b by the timer interruption control, cancels the stand-by mode and starts again the power feeding to the x coordinate detecting means 3a.

[0014]

Fig. 4 is a flowchart illustrating an embodiment of the processing operation in relation to the present invention of the mouse illustrated in Fig. 3. The control means 5b of Fig. 3 determines whether the mouse is operated or not (step 401) with the coordinate system from the x coordinate detecting means 3a and y coordinate detecting means 3b. If the mouse is not operated, power feeding to the x coordinate detecting means 3a in Fig. 3 is stopped (step 402). Here, the control means 5b itself is set to the stand-by mode (step 403). When mouse operation is detected in the step 401, the coordinate signal from the x coordinate detecting means 3a and y coordinate detecting means 3b is transmitted to the apparatus body side (step 404).

[0015]

Fig. 5 is the block diagram illustrating the fourth embodiment of the structure in relation to the present invention of the cursor manipulating device of the present invention. In this figure, 1c designates a mouse as the cursor manipulating device of the fourth embodiment; 2, a freely rotatable ball; 3, a ball rotating information detecting means for detecting direction and amount of rotation of ball 2; 4b, a

manipulating person detecting means for detecting, by a photosensor, whether a hand of manipulating person is touched to rotate the ball 2 or not; 5c, a control means to conduct stand-by mode control on the basis of the detection result of the manipulating person detecting means 4b for the condition whether a hand of the manipulating person is placed on the mouse or not. The mouse 1c is provided with a button not illustrated and the manipulating person can input the instruction of icon manipulation, etc. in the apparatus body side with manipulation of this button.

[0016]

In the mouse 1c of the fourth embodiment, the control means 5c stops, when the signal from the manipulating person detecting means 4b indicates that the manipulating person does not use the mouse 1c, the power feeding to the ball rotating information detecting means 3 and sets itself to the stand-by mode. In this stand-by mode, the control means 5c performs the operation only to monitor, by the timer interruption control, the detecting operation with the manipulating person detecting means 4, whether a hand of the manipulating person is touched on the mouse 1c or not. Therefore, power feeding from the apparatus body side is no longer required to realize power saving. When the manipulating person uses the mouse 1c, the manipulating person detecting means 4b detects a hand of the manipulating person. The control means 5c inputs the detecting signal of the manipulating person detecting means 4b by the timer interruption control to cancel the stand-by mode and starts again the power feeding to the ball rotating information detecting means 3.

[0017]

Fig. 6 is a flowchart illustrating an embodiment of the processing operation in relation to the present invention of the mouse of Fig. 5. The control means 5c in Fig. 5 determines whether a hand of manipulating person is placed on the mouse or not with the signal from the manipulating person detecting means 4b of Fig. 5 (step 601). If the hand of manipulating person is not placed on the mouse, power feeding to the ball rotating information detecting means 3 in Fig. 5 is stopped (step 602). The control means 5c itself is set to the stand-by mode (step 603). In the step 501, when the hand of manipulating person is placed on the mouse, information from the ball rotating information detecting means 3 of Fig. 5 is transmitted to the apparatus body side (step 604).

[0018]

As is explained with reference to Fig. 1 to Fig. 6, in the mouse of this embodiment, when the ball is not rotated, the mouse is assumed not to be used. Accordingly, the power feeding to the ball rotating information detecting means to detect direction and amount of rotation of ball such as x coordinate detecting means is stopped and the control means itself is set to the stand-by mode for detecting the start of manipulation of mouse by the manipulating person with the timer interruption control. Thereby, power saving of the mouse itself can be realized as explained above. Moreover, since power feeding control to the ball rotating information detecting means is conducted depending on the fact whether hand is placed on the mouse or not, unexpected cursor movement due to collision of document, etc. may be avoided simultaneously with power saving.

[0019]

The present invention is not limited to the embodiment explained with reference to Fig. 1 to Fig. 6 and it may be changed or modified variously within the scope not departing from its spirit and subject matter. For example, in this embodiment, as a cursor manipulating device, a mouse has been used for explanation but however a track ball may also be used.

[0020]

[Effect of the Invention]

According to the present invention, power saving of the cursor manipulating device such as mouse and track ball may be realized efficiently and thereby operating time of battery driven personal computer and computer apparatus of work station and word processor can be extended.

[0021]

[Brief Description of the Drawing]

[Fig. 1]

Block diagram illustrating the first embodiment of the structure in relation to the present invention of the cursor manipulating device of the present invention.

[Fig. 2]

Block diagram illustrating the second embodiment of the structure in relation to the present invention of the cursor manipulating device of the present invention.

[Fig. 3]

Block diagram illustrating the third embodiment of the structure in relation to the present invention of the cursor manipulating device of the present invention.

[Fig. 4]

Flowchart illustrating an embodiment of the processing operation in relation to the present invention of the mouse in Fig. 3.

[Fig. 5]

Block diagram illustrating the fourth embodiment of the structure in relation to the present invention of the cursor manipulating device of the present invention.

[Fig. 6]

Flowchart illustrating an embodiment of the processing operation in relation to the present invention of the mouse of Fig. 5.

[Description of the Reference Numerals]

1, 1a to 1c: Mouse;

2: Ball;

3: Ball rotating information detecting means;

3a: X coordinate detecting means;

3b: y coordinate detecting means;

4: Manipulating condition detecting means;

4a: Ball rotation detecting means;

4b: Manipulating person detecting means;

5, 5a to 5c: Control means;

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